

FERAL BURROS OF SAN MIGUEL ISLAND

Charles L. Douglas, Ph.D.  
Senior Research Scientist, Unit Leader  
CPSU/Univ. Nevada, Las Vegas

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San Miguel Island has a number of outstanding resources, several of which are unique to this island. Perhaps the most striking of the resources occurs in the lower elevations of the beach where large numbers of pinnipeds come for reproduction. More species of pinnipeds utilize San Miguel Island for reproduction than any other of the Channel Islands. The island also is the farthest southern limit of the northern Fur Seal, which reproduces there. The necessity of protecting these hundreds of pinnipeds from harassment and pollution is obvious.

Another outstanding resource are the extensive prehistoric and historic camp sites of the Shumash Indians. The middens of some sites are exposed along the bluffs of the island, and in the larger sites consist of 10 to 15 feet or more of stratified layers which contain innumerable bones of pinnipeds and fish as well as abalone and mussels. These deposits are truly outstanding resources that should be protected from erosion and trampling. It is likely that these are the finest sites of these ancient people still in existence.

A unique and enigmatic "forest" of caliche occurs on the northern part of the island. These tubes are thought to be castings of old roots of plants that somehow were coated with caliche, which remained after the plants decayed. Many tubes project above the ground for several feet, and are in numerous and contorted forms that are very fragile.

### Resource Problems

One of the resource problems on the island is the invasion by two species of ice plant. These exotic forms occur along the California and Baja California coasts. On San Miguel, the ice plant is invading large areas of the island, and threatens native vegetation.

Another resource problem is the feral burro, which is the subject of this report. These exotic animals were released approximately 15 years ago, and for some reason were not removed by the Navy when other feral livestock was removed from the island. They cause damage by trampling and by creating trails, which thereby accelerates erosion. They also eat large quantities of native vegetation. It is known from other studies that burros can have a detrimental effect on populations of small mammals, and a secondary effect upon predatory birds and mammals that rely upon the rodents for food (Carrothers, et al. 1976).

The decision to remove burros from San Miguel Island was made following an Environmental Assessment of the situation. It was determined that removal of so few individuals would not constitute a significant action on the part of the National Park Service. Because of my familiarity with burros and with evaluation of habitat damage, I was invited to participate in the reduction program and to assist by collecting specimens and other data from sacrificed animals.

On December 13, 1976, I accompanied Superintendent William Ehorn and the former Assistant Superintendent to San Miguel Island. The flight to the island allowed a perspective of the caliche forest, the northern side that was inhabited by the burros, and the numerous trails that crisscross these parts of the island. Burros were located from the air, and several animals were seen in the caliche forest.

On the following morning, we hiked to those parts of the island where we had seen the burros. Individual animals were sacrificed by shooting. Each was examined for ectoparasites and physical condition. Body measurements were taken as follows: total length, tail, hind foot, ear, head length, lower jaw, heart girth and height to top of scapula. Dentition was examined for approximation of age. Approximately 10cc of blood were drawn from the external jugular vein of each animal. This blood was placed in Vacutainer vials and was kept chilled for examination for disease organisms.

### Results

One of the most striking features of the burros was the poor condition of their hooves. All but the very youngest individual had an excessive growth of hoof material that had not worn away, and therefore curved either forward or sideways in an arc from the foot. This relatively massive hoof did not have a normal flat surface to support the weight of the animal; instead, individuals having such grotesque hooves were forced to walk on a curved surface. The lack of normal wear on the hoof is attributable to the paucity of rock on the island. Most of the island is covered with sand, and this does not abrade the hoof enough to allow normal wear. It is noteworthy that individuals having such large, curved hooves probably could not walk on a hard, flat surface. They can walk and run on the sand because their hooves sink slightly into it. It is extremely unlikely that a veterinarian could trim such an excessive hoof into a normal configuration without crippling the animal. [There was an extremely old bighorn ram at the Desert Game Range near Las Vegas that had developed excessively large hooves after years of captivity. The large hooves were crippling the animal and it was not possible to trim them because the blood vessels supplying the hoof remained present throughout most of its length - instead of remaining proximal to the wear-surface, as under normal conditions.]

I have examined more than 100 feral burros in DEVA, and have never seen hooves approximating the condition of those on burros of San Miguel Island.

I consider the poor condition of the hooves to be closely linked to the "reluctance" of the burros on San Miguel to run for long distances, as well as to the unusual age structure of the population.

A total of 23 individual burros were sacrificed. The age groupings, as determined by tooth eruption and wear, are presented in Figure 1. It is interesting, and unexpected to find so many young individuals in the population. Despite the fact that burros on the island were released to the feral state some 15 years ago, there were only three individuals among the group that were older than five years. This is a young adult age for burros. Thus, there appears to have been a considerable turnover of the population in the past 15 years. It is unlikely that any of the original animals in the population are still alive.

Our data indicate that five to six years of age may be close to the maximum life expectancy for burros on San Miguel Island. This is most unusual, because burros are long-lived animals. A five-year old burro in Death Valley would be considered a young adult having at least five to ten more years of life expectancy.

The only factor that we found which could help explain the relatively young age of the population is the condition of the feet. As hooves grow progressively larger, it would become increasingly more difficult for older individuals to move about. We noted that some of the older individuals moved very little, and tended to move only short distances before stopping. Any impairment of movement could be expected to create problems for the individual in feeding. If the individual had some difficulty in moving around to obtain new forage, this increment of stress would be expected to make that individual more vulnerable to disease. Although this is largely supposition, there are enough examples of stress related problems among mammals that such a rationale seems reasonable.

Of the 23 burros examined 17 were male, 6 female. Four of the six females were lactating. The lopsided sex ratio indicates an unusually high mortality of females, which might have been exacerbated by general harassment during breeding periods by so many males pursuing so few females. Burros are polyestrous. In DEVA, some females are bred during post-partum oestrus, whereas others are not. Considering the lopsided sex ratio in the San Miguel herd, it seems unlikely that an oestrus female could escape being bred. Extensive breeding activity during post-partum oestrus could easily lead to infection in the females that could terminate in death. Since we do not know how many individuals of either sex were released originally we can only assume that there was a 50:50 ratio of males to females. It is apparent from our data that members of the herd are not living to relatively old ages; females apparently are faring even less well than males, and appear to be selected against, resulting in approximately a 2.8 to 1 ratio of males to females.

Table 1 summarizes bodily measurements taken on the 23 individuals examined. In DEVA, we have found no significant difference between measurements for

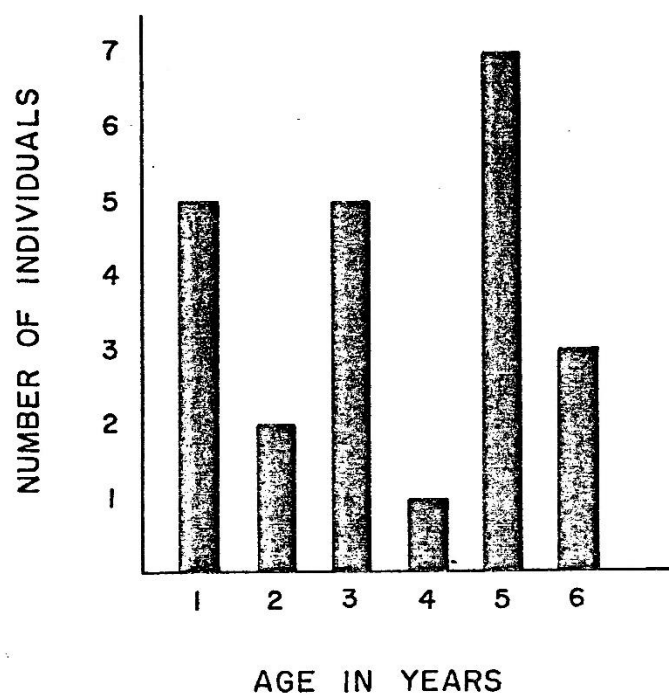


Figure 1. Age distribution of 23 burros from San Miguel Island.

Table 1. Measurements of feral burros from San Miguel Island. All measurements are in inches.

NO./SEX	HEART	HEIGHT	NECK	TOTAL LENGTH	TAIL	HIND FOOT	EAR	HEAD	AGE	AGE GROUPINGS			%
										♂	♂+♀		
1 ♂	57	49	27	101	15	21	9.5	22	5	1 - 4	1 - 5		22
2 ♂	53	48	26	95	12.5	20	10	21	5	2 - 1	2 - 2		8.7
3 ♂	47	46	23.5	87	16	19.5	9.5	18	1	3 - 5	3 - 5		22
5 ♂	56	49	26	100	15	21	8.5	21	5	4 - 1	4 - 1		4.3
6 ♂	56	50	—	96	14	20	9.5	20	4+	5 - 5	5 - 7		30
8 ♂	59	49	26	101	—	21	9.5	20	3+	6 - 1	6 - 3		13
9 ♂	49	41	22	83	13	20	9	17.5	1				100
12 ♂	48	44	23	86	13.5	21	9	19	1				
13 ♂	50	48	24.5	96	14.5	19	9	19	2				
14 ♂	59	49.5	26	101	12	21	9.5	20	5				
15 ♂	55	49	25	99	13	20.5	8	20	6				
16 ♂	57	48	29	104	14	20	10	19.5	3+				
17 ♂	56	49.5	30	99	14	20.5	10	20	3				
18 ♂	58	46.5	27	92	12	20	9.5	19	1				
19 ♂	52	50	26	101	15	20	9	20	3+				
20 ♂	—	46	30	98	15	20	9	20	3+				
21 ♂	—	50	33	103.5	—	20.5	10	20	5				
4 ♀	58	50	—	102	14	21	10	19	6 (Lact)	♀ 1 - 1			
7 ♀	56	51	23	104	16	21	10	21	5 (Lact)	2 - 1			
10 ♀	51	47	23	83	10	20.5	10	18	1	3 - 0			
11 ♀	57	51	23	100	14	20.5	10	20	5 (Lact)	4 - 0			
22 ♀	58	49	27	102	13	20.5	10	20	6 (Lact)	5 - 2			
23 ♀	50	48	—	97	12	20.5	9	20	2	6 - 2			

males and females, utilizing large samples. Therefore, these data can be considered together.

#### Impact of Burros on Resources

The major damage caused by burros on San Miguel results from trail development which crisscrosses parts of the island. These trails are readily visible from the air. Trails are particularly severe on the bluffs of the island overlooking the ocean. Trails in these areas cross extensive archeological sites, resulting in impact damage and compaction, as well as increasing erosion.

There are extensive trails through the small stand of giant Coreopsis, an endemic species of sunflower, that occurs on the northern bluffs. Trails here have been trampled several inches into the soft sand, and have resulted in plant destruction as well as increased erosion. Burros also appear to have been foraging on some of the Coreopsis plants.

The caliche forest is suffering damage from trailing and trampling of the caliche formation. At least one burro was observed leaning against a vertical caliche formation and scratching himself on it. It would be relatively easy for burros to trail through the caliche forest and trample the formations until they are no longer one of the outstanding features of the island.

#### Management Suggestions

All burros should be removed from San Miguel Island without delay. The damage they have caused is irreversible and unnecessary. Burros have never been part of the native fauna; they are exotic and should be removed, as stipulated in NPS Management Policies for Natural Areas. It is unfortunate that they were not removed by the Navy when other feral livestock was removed from San Miguel Island.

Shooting is the most expedient and humane method for removing these animals. Because of their hoof problems, it is unlikely that they could ever be rehabilitated to serve as a pack animal. The expense of capture, sedation and transport of burros from San Miguel would be incredibly high and not worth the cost. Burros are not uncommon animals. Furthermore, DEVA has an on-going program whereby interested California residents can obtain feral burros by obtaining the proper permits. I strongly recommend that any remaining burros on San Miguel be eliminated as quickly as possible. The destruction of archeological and floral resources dictates such an action. There is no acceptable alternative.

The large archeological site on the north side of the island is eroding

away as the bluff is sluffing into the ocean. This site has an incredible midden, which is at least 10-15 feet deep and contains numerous stratified layers which are visible on the eroding side. This site should be excavated in the near future to obtain data that otherwise will be lost. Such an excavation will be a major project, for the site is large. Nevertheless, the size of the deposit and the outstanding stratification should enable the scientists to learn a great deal about the history and prehistory of the Shumash Indians and their ancestors. Such an excavation should be multidisciplinary, because thousands of bones and shells are visible in the stratified layers. I would be extremely interested in working on the bone analyses if such a project were to occur.

The infestation of two species of ice plant present a management problem. There probably are seeds of this plant everywhere, therefore it will never be possible to eliminate it. Ice plant provides some stabilization of sandy areas, and thereby is of some value. Nevertheless, it should be kept out of areas having endemic species of plants - such as the giant Coreopsis stand. Removal probably is best accomplished by hand, since I can find no information on natural predators for these species.

I believe it would be possible to remove large quantities by hand, providing enough people were available. Youth Conservation Corps personnel would seem to provide a possible source of labor, but it should be kept in mind that such efforts also will result in impact on an area. Hand removal of ice plant probably would need to be redone each five years.

#### Literature Cited

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